

DETERMINANTS OF OBESITY IN LATINOS IN ANCHORAGE, ALASKA:

ANALYSIS OF BRFSS ALASKA DATA, 2007-2013

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DETERMINANTS OF OBESITY IN LATINOS IN ANCHORAGE, ALASKA:  
ANALYSIS OF BRFSS ALASKA DATA, 2007-2013

A  
PROJECT REPORT

Presented to the Faculty  
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By

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## **Abstract**

Determinants of obesity can be complex and group specific. There is limited data about the Latino population and the health needs of Latinos in the state of Alaska. The goal of this project was to better understand the determinants of obesity in Latinos, including the impact of dietary choices, financial status, mental health, and exercising in the levels of obesity of Latinos. The investigator used Statistical Package for the Social Sciences (SPSS) to study the association of several variables in the Behavioral Risk Factor Surveillance System (BRFSS). After data exploration, univariate analysis and logistical regression were conducted for selected variables related to the causes of obesity in Latinos living in the state of Alaska where the investigator observed higher percentages of obesity in Latinos as compared to other groups. However, results were not statistically significant except for the higher percentages with high blood pressure in obese Latinos when compared to non-obese Latinos and other groups. The results produced by this study are evidence that further research is needed to determine the impact of obesity in Latinos and their differences with other groups.

## Table of Contents

	Page
Signature Page.....	i
Title Page.....	ii
Abstract .....	iii
Table of Contents .....	iv
List of Figures .....	v
List of Tables.....	vi
Chapter 1: Introduction and Background.....	1
Chapter 2: Project Goal, Specific Aims, and Objectives .....	10
Chapter 3: Methods .....	11
Chapter 4: Results .....	15
BMI.....	17
Mental Distress.....	18
Poverty.....	19
Consumption of Fruits and Vegetables.....	21
Spatial (Geographic Information Systems) Analysis.....	22
Exercise and Limitations in Physical Activities.....	25
Health Outcomes.....	29
Chapter 5: Discussion.....	32
Chapter 6: Strengths and Limitations.....	34
Chapter 7: Public Health Implications .....	35
Chapter 8: Conclusions and Recommendations.....	36
References.....	37
Appendix.....	39

## List of Figures

	Page
Figure 1: Latino, population growth in the state of Alaska, 2007-2013 .....	15
Figure 2: BMI levels higher than 25 for Latinos and other groups.....	17
Figure 3: Obesity in Latinos and reports of frequent mental distress compared to other groups.....	18
Figure 4: Obesity in Latinos using the 185% of the Alaska poverty guidelines compared to other groups.....	20
Figure 5: Obesity in Latinos and consumption of 5 fruits and vegetables per day compared to other groups.....	22
Figure 6: Obesity in Latinos and consumption of 2 fruits and 3 vegetables per day compared to other groups.....	23
Figure 7: Distribution of Latino population in Anchorage compared to households receiving food stamps and distribution of major grocery stores.....	24
Figure 8: Distribution of Latino population in Anchorage and distance to major grocery stores.....	25
Figure 9: Obesity in Latinos who met 150+ minutes of aerobics per week compared to other groups.....	26
Figure 10: Obesity in Latinos who had poor health and physical limitations for more than 14 days compared to other groups.....	27
Figure 11: Non-gestational diabetes in Latinos compared to other groups.....	28
Figure 12: High blood pressure in Latinos compared to other groups.....	29
Figure 13: High cholesterol in Latinos compared to other groups.....	30

## List of Tables

	Page
Table 1: Sample of Latinos by Sex and Age in the BRFSS 2007-2013, Compared to the Total Estimate of Latinos from the ADOLWD.....	16
Table 2: Sample Number of Other Groups by Sex and Sge in the BRFSS 2007-2013 Compared to the Total Estimate of Other Groups from the ADOLWD.....	16
Table 3: WIC Eligibility Criteria for the State of Alaska (USDA, 2015).....	19
Table 4: Odds Ratios of Latinos Who Were Obese Compared to the 185% Poverty Guidelines .....	21

## **Chapter 1: Introduction and Background**

Obesity has been defined by the National Institutes of Health (NIH) as a body mass index (BMI) of 30 and above (NIH, 2012). This public health issue is a major contributor to chronic diseases such as diabetes, high levels of cholesterol, and coronary artery disease. Levels of obesity in Latinos have been attributed to several determinants including acculturation, mental health, and poverty. The Latino population is growing demographically nationwide and particularly in the Northwestern regions. According to the U.S. Census Bureau (2010), population projections for the state of Washington, Hispanics were the fastest growing group from 2000 to 2010, with 71% growth. During the same decade, the status of the population in the state of Alaska showed an increase from 25,852 to 39,870 individuals of Hispanic origin creating a 54% growth (U.S. Census Bureau, 2010). There were no Alaska-based studies pertaining to the health outcomes that were related to obesity in the Latino population. While several national studies showed that Latinos' high level of acculturation was an indicator of higher BMI and rates of obesity (Hubert, Snider & Winkleby, 2005), there was little research about the possible impact of mental health components in the levels of obesity in Latinos.

In a study of Latino health behaviors and acculturation factors that might contribute to obesity, Latinos with the highest levels of acculturation had higher rates of obesity than those who sustained the cultural traditions of origin (Hurbert et al., 2005). Past research that focused on immigrations and the general trends of BMI in Latinos showed that there was an increase in BMI in later generations of U.S. Latinos (Bates et al., 2008). However, obesity is a complex concept where many determinants are at play and cannot be explained by using only one determinant such as "acculturation." Several

other factors such as genetic predispositions, environmental conditions, and mental health status can affect the rates of obesity in Latinos as well as other groups (Solis, 2012).

In addition, since poverty and geographical location can have an impact in the levels of obesity and the mental health status of an ethnic group, this study included the effort to determine possible associations between variables related to socioeconomic status and distance to fresh produce using Geographic Information Systems (GIS). In order to find possible associations between variables related to obesity, the principal investigator (PI) conducted a quantitative study of secondary data from the Behavioral Risk Factor Surveillance System (BRFSS). The data contains values for the period of 2007 to 2013 for a sample size that included 612 Latino individual responses from the standard survey or 1,172 from the combined surveys.

At the time of the study, there was limited information and research on the general health status of Latinos in the state of Alaska, and even less on the public health concerns of obesity in Latinos. The only information available was found in a preliminary report sponsored by the Consulate of Mexico in Anchorage and Nix (2012), which contained general findings on Latino health.

First, it is important to remark that the issue of obesity is complex and is sometimes connected to several variables. Therefore, investigating the general health status of the population was crucial to determine which variables may affect a particular health issue. The Alaska Department of Health and Social Services (AK DHSS) has been collecting data about Latinos in Alaska since 1991. However, there were no studies conducted about Latinos specifically with the data from the BRFSS. Latinos adapting to circumpolar health areas



would greatly benefit from population-specific studies on obesity and mental health that can produce knowledge for future cultural-specific programs and funding.

Demographic growth data at a national level came from a variety of sources. In the U.S., schools districts reported that Hispanic attendance nearly doubled during the last decade of the 20th century. According to Fry and Gonzales (2008), data about the growth in Hispanic population in public schools nationwide shows that the number of Hispanics nearly doubled from 1990 to 2006, accounting for 60% of the total growth in public school enrollments over that period. Hispanic growth at enrollment is expected to continue for decades, according to population projection by the U.S. Census Bureau (Fry & Gonzales, 2008, p.i). Data from the Centers for Disease Control and Prevention [CDC] (2015) revealed that in 2011-2012, there was 2.5% prevalence of Latino adults that were overweight or obese in the U.S. Some of the most important priorities when identifying pressing issues in the health status of Latino youth were high rates of school dropout, high risk of developing mental health and developmental conditions, and a disproportional high prevalence of dental caries (Flores et al., 2002).

According to the Study of Latinos (SOL) created by the Hispanic Community Study of Latinos (HCSL), half of the Latino population between the ages of 45 and 64 years old were at risk of developing diabetes. In addition, a high number of Latinos reported that they did not treat their high blood pressure, and physical activity was limited across the lifespan (U.S. Department of Health and Human Services [DHHS], 2014). This study was a collaboration supported by contracts from the National Heart, Lung, and Blood Institute (NHLBI), the University of North Carolina, the University of Miami, Albert Einstein College of Medicine, Northwestern University, and San Diego State University. This collaboration produced important research information on a variety of topics that might be associated with obesity.

The results of this project constituted one of the major epidemiological studies conducted in Latino populations nationwide.

Some of the key findings remarked by the HCSL included variables such as high soda consumption with 53% of Latinos reporting drinking soda daily. In addition, about 27% of Latinos reported not having an identified health provider to go to when they felt sick, and 40 % of Latinos reported that they worried about getting into debt if they had an accident or a long-term illness compared to 22% of non-Latino blacks, and 11% of whites (U.S. DHHS, 2014). Reports on health habits of Latinos showed that men were more likely to smoke than women, and men also consumed more salt than women and were more likely to drink alcoholic beverages. In addition, about half of all women between 45-74 years of age were overweight, and women between 45-74 years of age were also more likely to report feelings of depression than men (U.S. DHHS, 2014).

An overview of selected health aspects of Latino refugees and immigrants in Canada was found at the Center for Addictions and Mental Health (CAMH). There were more than half a million Hispanics in Canada in 2008, and 30% were refugees that migrated due to political persecutions in their countries. An overview of the information collected by CAMH showed a variety of cultures represented under a major group that had members of 21 countries.

Some of the challenges remarked in this overview included the struggle of immigrants and refugees with their language barrier in seeking health and social services. The CAMH (2008) reported the impact of the emotional burdens of trauma in refugees when deciding to seek medical assistance. Family and community disconnection lead to isolation, which made healing from trauma more difficult.

Due to the lack of studies conducted in Alaska, the Anchorage regional portion of the literature review included the main findings shown in “A Report on a Preliminary Health Needs Assessment of the Hispanic Population in Alaska” (Consulate of Mexico in Anchorage and Nix, 2012). This report showed some of the general health status of Latinos in the state of Alaska. According to the 2010 U.S Census, 39,249 Hispanics resided in the state of Alaska, 5.5% of the state’s total population. Half of these residents were of Mexican origin, and the distribution of the Hispanic population was higher in the following locations: Anchorage (56.2%), Fairbanks (14.4%), Matanuska-Susitna Valley (8.4%), Kenai Peninsula (4.2%), and Juneau (4.0%) (Consulate of Mexico in Anchorage and Nix, 2012).

The preliminary report was based on information from surveys that produced a demographic assessment and health status-related data. The main findings showed that Latinos accessed health information first through a doctor or a nurse and then family members. Important findings in this report showed that 66.1% of the participants had medical insurance, while 33.9% did not have any kind of health coverage. Regarding “seeking medical attention”, 42% would go to the doctor, 31% would go to a clinic, 8% would go to a hospital, and 3% would go to the emergency room. An interesting finding was that 16% reported they do not seek medical attention. Perceived health conditions among members of this group showed that 45 out of the 63 respondents considered themselves having a “good” or “excellent” health status. In addition, 41 out of 62 respondents had a physical examination in the past 12 months and 38 of the 61 respondents had a dental exam in the past 12 months. Some of the medical diagnoses reported by this group included high blood pressure, high cholesterol, diabetes, anxiety/depression, obesity, asthma, kidney disease, hepatitis, tuberculosis, and cancer. In this study, the two medical conditions that were most frequently

reported included high cholesterol and high blood pressure. Regarding the use of prescription medicines, 36% were using prescription medications, and 11% were taking non-prescription medications. Information about exercising showed 32.8% participants did not exercise and 27.9 % exercised less than one day per week (Consulate of Mexico in Anchorage and Nix, 2012). On smoking habits, 87.1% of participants did not smoke. In addition, regarding alcohol consumption, 58% stated that they did not drink alcohol and 19.4% drank less than one time a week and 12.9% drank once a week..

The summary of findings in this report highlighted the fact that Latinos who did not access health care services stated that they lacked the money or health insurance to pay for those services. In addition, language barriers kept some of the participants from seeking services.

Overall, some of the issues described in the literature that were related to the public health issue of obesity were immigration, genetic and environmental causes of obesity, and the impact of socioeconomic status, but very little attention has been given to both mental health and geographical location of Latinos.

Among the most noticeable determinants of obesity in Latinos found in the literature were high levels of acculturation, adverse environmental and genetic conditions, and low socioeconomic status (SES). The impact of SES on the high obesity levels in Latino women suggested that those with the highest food insecurity were more likely to become obese, with some studies showing a prevalence of obesity of a 50-60% in Latino women with food insecurity (Kaiser et al., 2004). In “A Systematic Review of Variables Associated with the Relationship between Obesity and Depression” conducted by Preiss et al. (2013), the authors claimed that the growth and comorbidity of both obesity and mental health created a

worldwide concern. Preiss et al. (2013) reviewed forty-six scientific reports and journal articles and concluded that issues such as obesity, educational attainment, body image, binge eating, physical health, psychological characteristics, and the effectiveness of interpersonal relationships could be associated with the relationship between obesity and depression.

Several concepts were of interest in this project; among them that mental health and poverty could be associated to obesity in Latinos. Obesity can be a complex topic, as there are many determinants such as diet, exercise, mental health, and income. However, two of the concepts in this project were poverty and mental health status such as depression and anxiety. As described in the literature review, Latinos worried about owing medical bills more than other ethnicities and racial groups and might not get medical attention to prevent financial problems (U.S. DHHS, 2014). In order to determine if poverty is affecting an ethnic group's choices in health access, it is important to capture their income, cultural practices related to obtaining health services, access to medical insurance, and geographical location. The BRFSS provided some useful variables that might provide insight to the Latino Health profile (CDC, 2006). Health access can also play a role in the obesity of Latinos because it could facilitate early detection and provision of health education provided at health clinics regarding eating healthier and exercising (State of Obesity, 2014).

Studies of ethnic variation as related to health disparities can be determined by using regression models to establish differences, if any, and help establish determinants of health outcomes for a specific population (Wu et al., 2005). Research has shown that there might be associations between health status and health outcomes, and social stratification can sometimes determine who obtains access to things such as healthy foods, health care, and/or health education (Wu et al., 2005). However, the methods in this project focused on the

particular health issue of obesity where the PI analyzed the possible associations between variables that might affect the rate of obesity in Latinos living in Anchorage, Alaska. Obesity might or might not be associated with socioeconomic status and could be affected by other variables such as mental health and geographical location (CAMH, 2008).

As explained earlier, obesity can cause many illnesses, among them diabetes, coronary artery disease (CAD), and high cholesterol levels. In addition, older Latino adults diagnosed with diabetes suffered from higher depression and anxiety (Siguenza, 2011). Several Spanish expressions for mental health issues such as “ataque de nervios” and “susto” seem to be comorbid in Latinos with diabetes. In addition, Siguenza (2011) emphasized the lack of studies that analyze the comorbidity between mental health issues and illnesses such as diabetes.

The significance of this project is connected to the lack of studies with this specific ethnic group within the state of Alaska. There were no studies analyzing data that explored the comorbidity of obesity and other issues such mental health in Latinos. The knowledge produced by the analysis of these data was unique to the state of Alaska and Latino health, and introduced new knowledge as a basis for further investigations.

The sampling design of the BFRSS database was tailored by each state depending on the characteristics of their geographic regions (CDC, 2014), and household samples might include several residents where interviewers collected information from entire families (CDC, 2014). Therefore, two potentials for bias came from considering the small sample size and several family members responding to the same questions. Both of which are frequently present in telephonic surveys collected by the BRFSS (CDC, 2014).

The effects of this research project may have a profound impact on the health services provided to Latinos statewide. It produced data from a geographical area that had limited information and scientific studies on Latinos. This quantitative study might lead to further research in specific health issues or geographical areas. Concepts that appeared in this project were poverty, mental health issues, and ethnic differences in health outcomes pertaining to the public health issue of obesity.

An additional challenge to be considered when analyzing data about Hispanics is under-reporting conditions or situations (Bothwell, 2009). Health issues such as injuries due to occupational hazards, use of alcohol, and food intake are some of the health problems where under-reporting might pose limitations to the outcome of data analysis (Bothwell, 2009). In a study of Mexican/Mexican American women, under-reporting dietary related information was most frequent in women who were obese, older, less educated, and poorer (Bothwell, 2009). The reasons why this group under-reported may vary across subgroups, but when looking at the dynamics of immigrations and other cultural determinants of the Latino culture, there is a double line of secrecy. First, undocumented immigrants might report less due to their legal status; and second, in the Latino culture, it is important to keep everything in the family.

Another important item that was considered in this project was the presence of health disparities in Latinos as compared to other groups related to obesity. “The State of Obesity: Better Policies for a Healthier America” analysis reported that 77% of Latinos were obese compared to 67.2% in other groups. This report also showed that a 13.2% of the Latino population had been diagnosed with diabetes compared to 7.6% in other groups (Jeffrey et al, 2014).

## **Chapter 2: Project Goal, Specific Aims, and Objectives**

The overall goal of this project was to better understand the determinants of obesity in Latinos. This project explored the association of variables as they related to the issues of obesity in Latinos living in Anchorage, taking into consideration the influences of poverty, mental health, healthy eating, exercising, and geographical location. The research questions included:

- Do Latinos reporting mental health conditions experience higher BMI percentages?
- Do Latinos with lower socioeconomic status have higher levels of obesity?

### **Specific Aims:**

1. To investigate the percentages of Latinos in the state of Alaska and analyze possible associations between obesity and other variables.
2. To investigate the differences between Latinos and other groups to determine possible health disparities.

### **The key objectives of this project were:**

Analyze the BRFSS data to specifically focus on variables that might affect obesity percentages and economic levels in Latinos residing in Anchorage, Alaska.

1. Determine if there are differences in the percentages of Latinos who are obese compared to other groups.
2. Map the distribution of Latinos and their access to fresh fruits and vegetables in Anchorage using Geographic Information Systems (GIS).



### **Chapter 3: Methods**

This project was based on the analysis of secondary data using quantitative methods. The population in this study was Latino adults living in the state of Alaska participated in the BRFSS survey. The investigator conducted data exploration, univariate analysis, and logistic regressions with datasets provided by the BRFSS. This cross-sectional analysis of Latino adults from 2007 to 2013 was produced using SPSS tools to analyze data from the BRFSS.

The AK DHSS, Division of Public Health provided data previously collected by the Alaska BRFSS from 2007 to 2013 to the principal investigator for analysis. Access to datasets was allowed under the supervision of the community partner and other analysis of datasets conducted by the PI did not contain identifiable information. The sampling methods of this project were those used by the BRFSS. It is important to describe the sampling methods utilized by this database to contemplate confidentiality procedures.

The BRFSS uses random sampling through phone calls, sometimes interviewing entire households (CDC, 2014). The BRFSS sampling method is also tailored by each state depending on their population and geographic characteristics (CDC, 2014). In this project, the data were extracted from the following sample: 612 Latino individual responses from the standard survey or 1,172 from the combined surveys. According to the community partner of the principal investigator, a sample of 100 or more individuals was considered sufficient to create a first string of data. Random sampling is one of the most common methods of sampling, and this sample corresponded to a small group taken from a larger sample of individuals of the same ethnic background living in the same geographical location. The investigator added the numbers for each year to increase the size of the sample and add significance.

## **Data Analysis**

During data exploration, some of the results were excluded from the study, such as the association of income and levels of education due to lack of significance to measure the impact of poverty on obesity with data from the BRFSS. However, it is important to consider that poverty is a complex concept, and even though many variables of poverty were measured in this project, these are not exhaustive of the entire social determinants that would indicate poverty in individuals or a population. Complex variables related to obesity were reduced to a series of small variables in the BRFSS database. This reduction facilitated measurements of health outcomes related to obesity in Latinos. Mental health conditions such as depression and anxiety might also affect obesity and food choices, especially in ethnic groups that might experience isolation. However, it is important to remark that the database had certain limitations. One of the limitations was the lack of variables that capture cultural determinants in food choices by ethnic groups. Another important limitation was the reduction in sample results when testing obesity with some of the variables related to poverty. The analysis focused on the exploration of different variables present in the BRFSS database and other spatial variables captured by the PI, such as walking distance to grocery stores using GIS. Data was used in the presence of the data analyst and the PI determined the selection of variables for the study. Data was displayed in tables and graphs to assess major patterns such as percentages of obesity. Graphs and maps were added to enhance visual representation of data for comparison.

First, the analysis presented a general status of Latinos as compared to BMI level or obese versus non-obese. Second, the investigator compared the percentages of Latinos who were obese versus other groups. This project included the univariate analysis of data to compare for associations between “obesity” as a dependent variable and the following independent variables:

“report of mental distress,” “Alaska poverty guidelines,” “physical activity limitations,” “5-A-Day Fruits and Vegetables,” “consuming 2 fruits and 3 vegetables,” “sugar sweetened beverages,” “stress on purchasing food,” “screen time, TV watching,” “following aerobic recommendations of 150 plus minutes of physical activity per week.” In addition, the following health outcomes were compared to obesity levels: diabetes, cholesterol, and high blood pressure.

This study also included the calculation of odds ratios when exploring the association of obesity to levels of poverty. However, not all variables related to poverty and dietary intake met the criteria of having more than 50 respondents; therefore, only those with more than 50 respondents were included in this study, with the exception of variables related to the consumption of fruits and vegetables, and reported frequent mental distress.

The investigator selected the following indicators that could be associated to obesity:

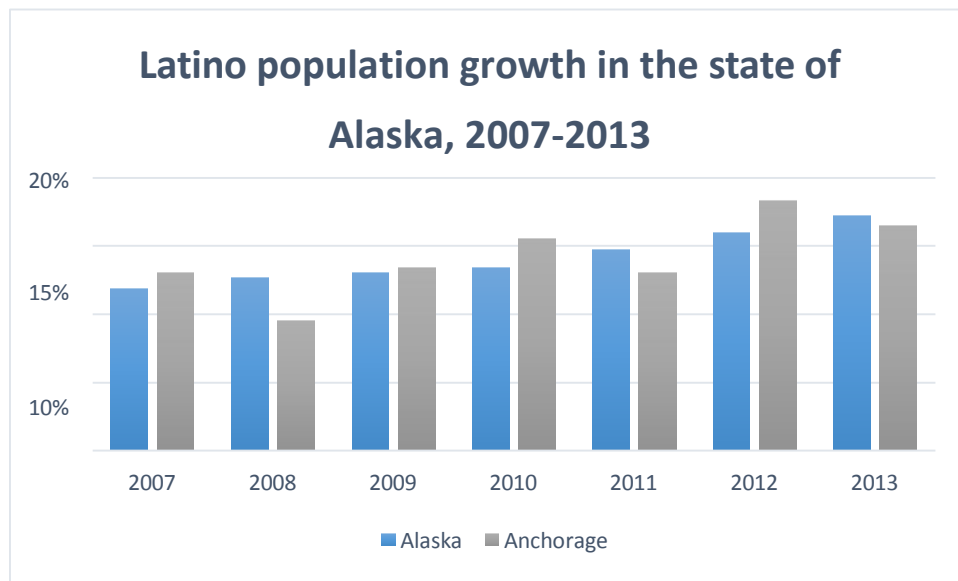
- Association of obesity and dietary questions such as “cholesterol awareness” and “consumption of fruit and vegetables” to the percentages of diabetes and other chronic health conditions in Latinos
- Association of mental distress and obesity
- Other emotional and/or physical conditions that might affect the daily living of Latinos and have the potential to affect levels of obesity

The focus was on variables that were identified as having a possible association with obesity. The questions in the database helped determine the presence of patterns or trends of health conditions such as diabetes, high cholesterol levels, CAD, and/or determinants of health in Latinos living in both urban and rural Alaska. In addition, this project included determining other sources of impact on health decisions, such as “geographical access” to fresh produce. To

determine the impact of health decisions pertaining food choices, the principal investigator generated a series of maps using Geographic Information Systems (GIS) tools to analyze the presence of certain behavioral choices pertaining to the consumption of fruit and vegetables.

## Chapter 4: Results

Basic demographic information in this study focused on population growth and included sex and age specific information of the sample from BFRSS. Population estimates showed that the percentages of Latinos living in the state of Alaska have grown from 4.7% in 2007 to 5.8% in 2013. The total number of Latinos living in the state of Alaska in 2007 was 22,394 and increased to 31,204 in 2013. There is a slight growth in the yearly population numbers of Latinos from 2007 to 2013 for both the state of Alaska and the Municipality of Anchorage (See Figure 1).



*Figure 1.* Latino population growth in the state of Alaska, 2007-2013.

One of the weighing methods used by the BRFSS is called “raking.” According to the DHSS (2013), raked estimates for the BRFSS weight the numbers of individuals who were surveyed on the phone compared to known population numbers for margins of age, sex, ethnicity, region, and socio-economic characteristics. “In raking, each margin is adjusted one at a time, with the process repeating until all of the margins are within 0.025% of the population

estimates” (DHSS, 2013, p.8). The raking weights produced for each year of the BRFSS are intended to correct for the complex sampling design in which each sex, age, race, region, and other characteristics are not represented equally in the survey (DHSS, 2013). Table 1 shows the sample numbers of Latinos by sex used in the BRFSS combined dataset from 2007-2013 compared to the number of Latinos according to data from the Alaska Department of Labor and Workforce Development (ADOLWD).

Table 1

*Sample of Latinos in the BRFSS by Sex and Age 2007-2013 Compared to the Total Estimate of Latinos, from the ADOLWD.*

Age (years)	Latino Sample (BRFSS)		Latino (ADOLWD)	
	Female	Male	Female	Male
18-24	67	73	15618	15469
25-34	157	113	25807	24541
35-44	162	85	21254	14578
45-64	213	193	26806	21442
65+	58	41	2514	3614
Total	657	505	919999	79644

For comparison purposes, the sample numbers from other groups used in the BRFSS from 2007-2013 combined dataset are compared to the total population estimate of other groups found in the ADOLWD, (See Table 2).

Table 2

*Sample Number of Other Groups by sex and age in the BRFSS 2007-2013 Compared to the Total Estimate of Other Groups from the ADOLWD.*

Age (years)	Other Groups (BRFSS)		Other groups (ADOLWD)	
	Female	Male	Female	Male
18-24	1281	1205	223693	264367
25-34	3334	2519	315076	345878
35-44	3747	3081	291571	320293
45-64	9247	8381	605086	672382
65+	3838	3020	195788	184264
Total	21447	18206	1631214	1787184

In order to choose the most significant variables from the BRFSS sample, the investigator conducted data exploration of the aspects of life captured by this surveillance system that might have an impact in estimates of obesity in populations. However, some variables were excluded from the results due to small sample numbers.

### BMI Results

The percentages that correspond to a BMI greater than 25 in the state of Alaska showed that 71.3% of Latinos had a BMI greater than 25 versus 65.7% for the rest of the groups. The results for those with a BMI lower than 25 were 28.37% of Latinos and 34.5% for the rest of the groups. While the BMI levels in Latinos were higher than in other groups, the results were not statistically significant (See Figure 2).

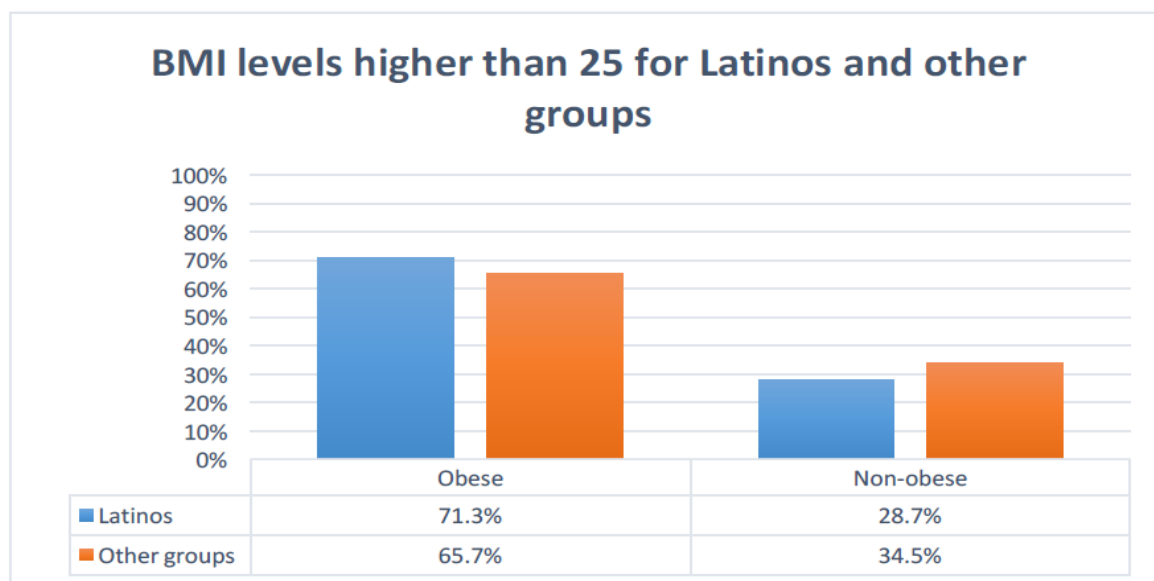
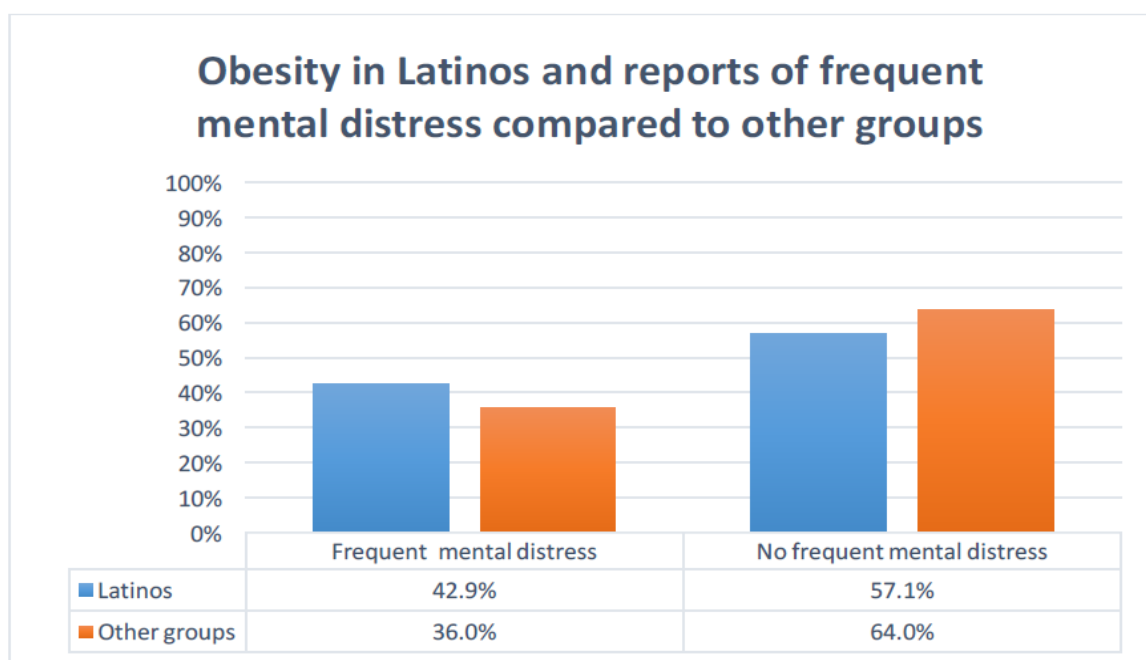


Figure 2. BMI levels higher than 25 for Latinos and other groups.

## Mental Distress

The only survey data that were related to mental health and showed a sample of over 50 respondents was “reports of mental distress.” The analysis of reports of distress showed that 42.9% of Latinos who reported frequent mental health distress were obese compared to 36% in other groups. In contrast, 57.1% of Latinos who reported not having frequent distress were, also, not obese compared to 64% in other groups (See Figure 3).



*Figure 3.* Obesity in Latinos and reports of frequent mental distress compared to other groups.

Based on the results of this association, it appeared that a higher number of non-obese individuals in both groups did not experience frequent mental distress. Due to the small sample of respondents, other possible mental health-related variables were excluded from the study after initial data exploration. This prevented further exploration of the impact of mental health in levels of obesity.’



## Poverty

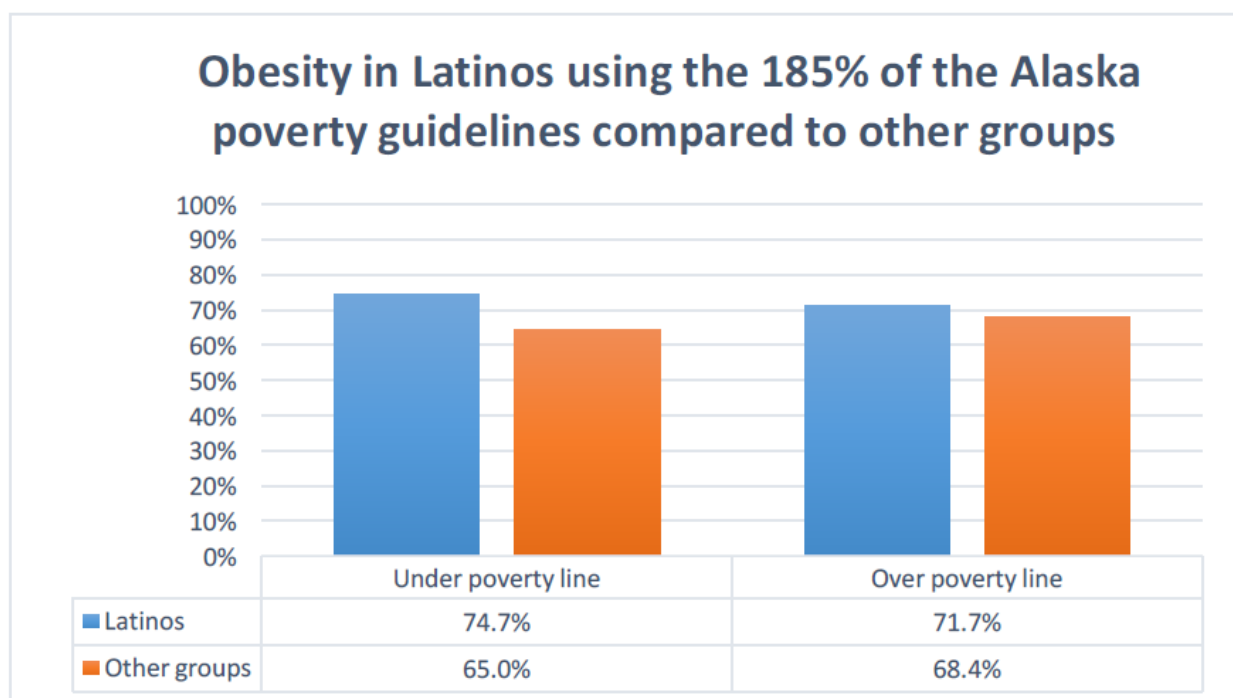
The variable chosen to show an estimate of obesity related to poverty was “185% over the Alaska Poverty Guidelines,” which was calculated based on eligibility for assistance from the Women, Infants, and Children (WIC) program. The eligibility guidelines for the State of Alaska are shown on Table 3, which contains data provided by the United States Department of Agriculture (USDA), Food and Nutrition Services (FNS), 2015.

Table 3

*WIC Eligibility Criteria for the State of Alaska (USDA, 2015).*

INCOME ELIGIBILITY GUIDELINES					
(Effective from July 1, 2015 to June 30, 2016)					
Reduce Price Meals – 185%					
Household Size	Annual	Monthly	Twice-Monthly	Bi-Weekly	Weekly
Alaska					
1	\$27,232	\$2,270	\$1,135	\$1,048	\$524
2	36,852	3,071	1,536	1,418	709
3	46,472	3,873	1,937	1,788	894
4	56,092	4,675	2,338	2,158	1,079
5	65,712	5,476	2,738	2,528	1,264
6	75,332	6,278	3,139	2,898	1,449
7	84,952	7,080	3,540	3,268	1,634
8	94,572	7,881	3,941	3,638	1,819
Each Add'l family member add	+ \$9,620	+ \$802	+ \$401	+ \$370	+ \$185

When looking at a variable connected to the impact of poverty in the development of obesity such as “185% over the Alaska Poverty Guidelines,” 74.7 % of Latinos who were under this poverty line were obese compared to 65% for the rest of the population. In addition, 71.7% of Latinos who were over the poverty line were obese compared to 68.4% in other groups (See Figure 4).



*Figure 4.* Obesity in Latinos using the 185% of the Alaska poverty guidelines compared to other groups.

In order to measure the association of exposure to obesity related to poverty, the principal investigator used odds ratios, which yielded the results presented on Table 4. The results were 1.116 odds ratio of obese Hispanics versus non-Hispanics and .914 of Hispanics over the poverty guidelines versus Hispanics at or below the poverty guidelines. These results were not statistically significant to affirm that poverty has an impact on the percentages of obesity found in Latinos. Based on the use of 185% Poverty Guidelines for the state of Alaska as an independent variable, poverty in Latinos is not indicative of obesity (See Table 4).

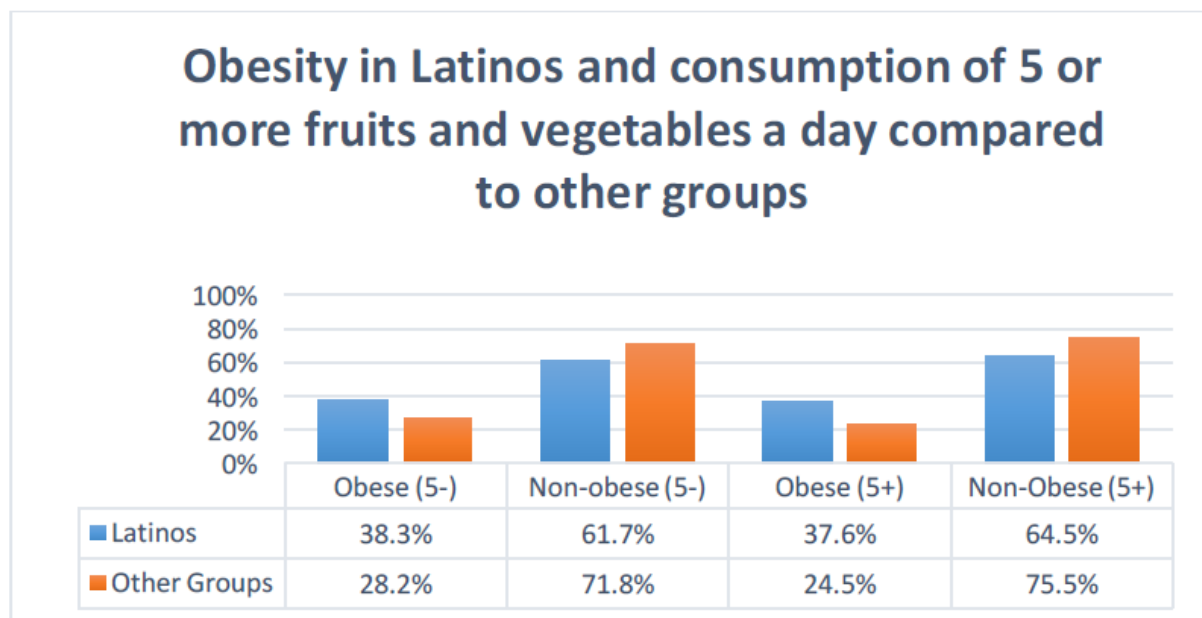
Table 4

*Odds Ratios of Latinos Who were Obese Compared to the 185% Poverty Guidelines.*

Obese Hispanic/Latino vs. Non-Latino	Odds Ratio	95% Confidence Interval	
		Lower	Upper
	1.116	.893	1.395

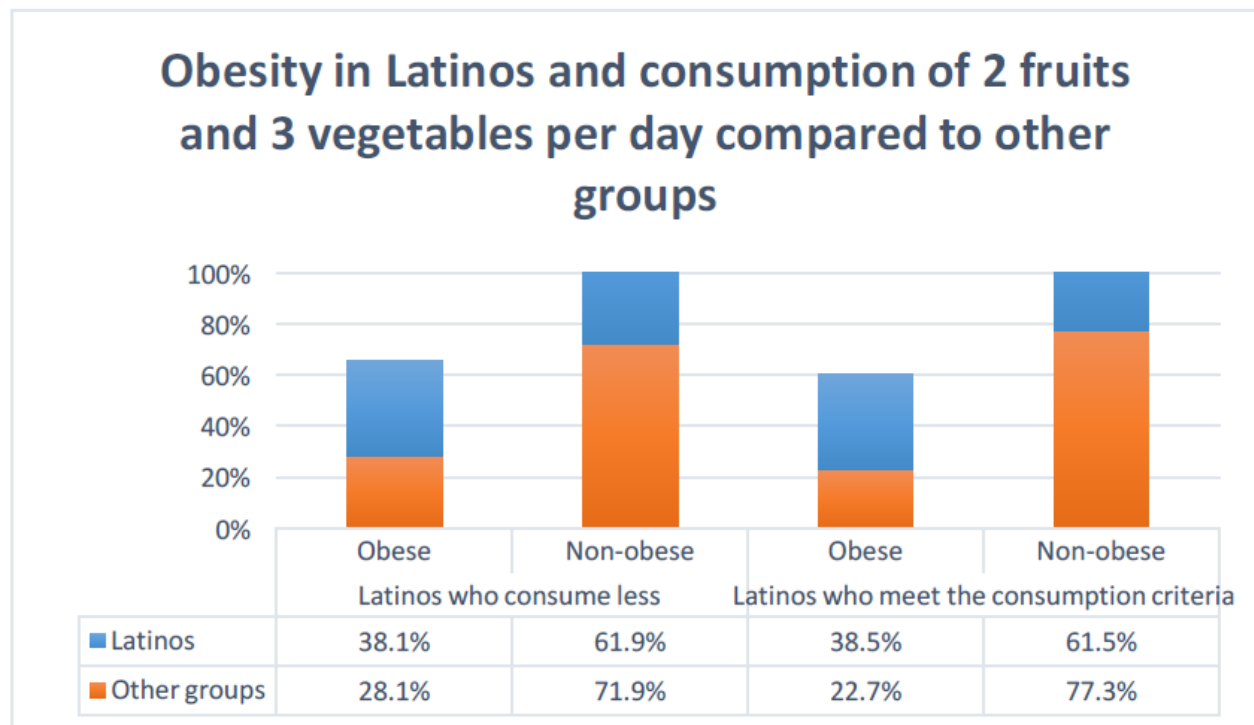
### Consumption of Fruits and Vegetables

On the one hand, the analysis of the association between obesity and the consumption of fruits and vegetables measured with the “5-A-Day vegetables and fruits” showed that there were 38.3% of Latinos that consumed less than 5 servings a day of fresh fruits and vegetables and were obese, versus 28.2% in other groups. In contrast, 61.7% of Latinos who consumed less than 5 vegetables and fruits a day were not obese compared to 71.8% in other groups. Of those who consumed 5 or more vegetables and fruits, there were 37.6% of Latinos who were obese versus 24.5% in other groups, while 64.5% of Latinos were not obese compared to 75.5 % in other groups (See Figure 5).



*Figure 5. Obesity in Latinos and consumption of five fruits and vegetables per day compared to other groups.*

When looking at those who did not consume “2 fruits and 3 vegetables,” 38.1% of Latinos were obese versus 28.1% in other groups, and 61.9% of Latinos who did not consume 2 fruits and 3 vegetables per day were not obese compared to 71.9% in other groups. In contrast, 38.5% of Latinos who consumed 2 fruits and 3 vegetables were obese versus 22.7% in other groups. In addition, 61.5% of Latinos who consumed 2 fruits and 3 vegetables were not obese versus 77% in other groups. Based on these results, even though estimates were higher for those Latinos who were obese, the consumption of fruits and vegetables was not statistically significant (See Figure 6).



*Figure 6.* Obesity in Latinos and consumption of two fruits and three vegetables per day compared to other groups.

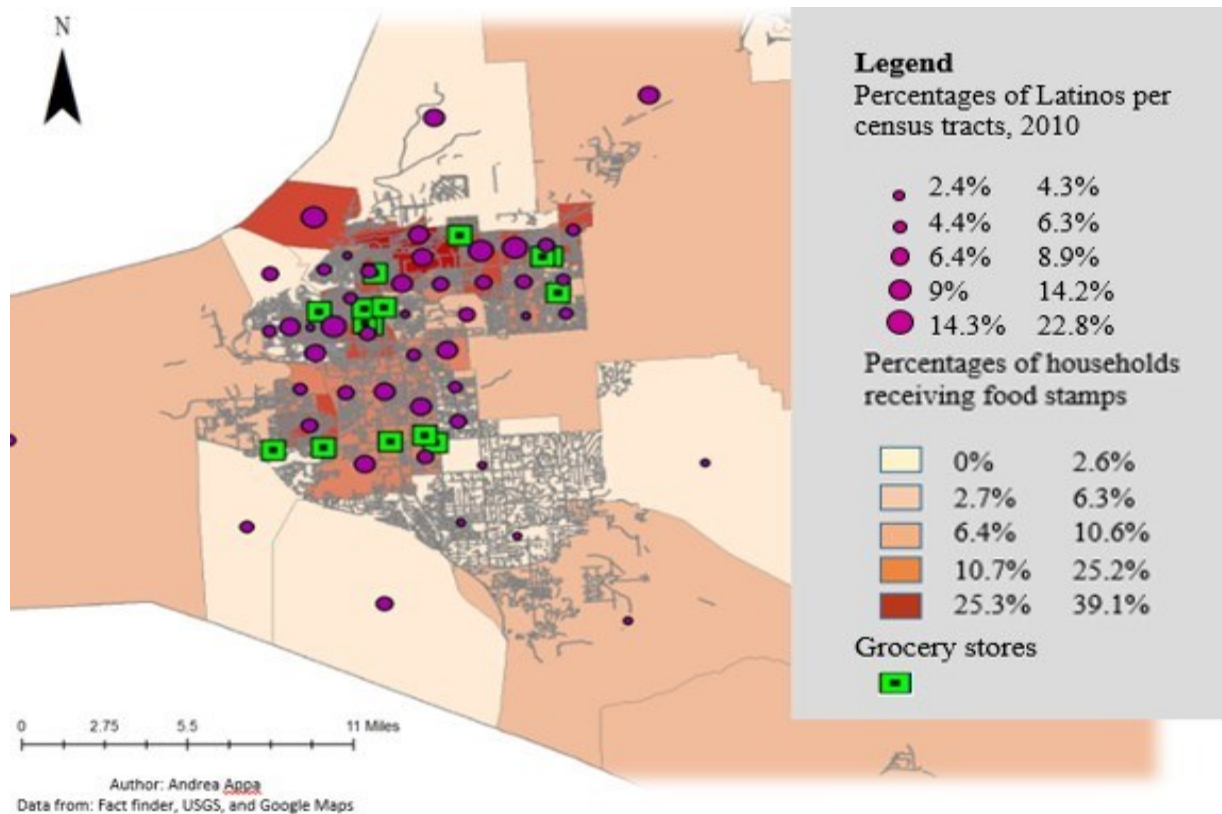
### **Spatial (Geographical Information Systems) Analysis**

This study included other components of information about Latinos that were displayed

in a spatial format with the use of Geographical Information Systems (GIS). The data collection included extracting information in the form of TIGER Files from the United States Geological Survey (USGS) and demographic information from the American Fact Finder website. The extraction of geographical spatial information included the distribution of Latino population and comparisons to other data such as poverty levels and access to fresh produce. Geospatial visualization may help identify important determinants of health, such as geographical access to major hospitals or neighborhood clinics. The GIS data were presented in the form of choropleth maps with graduated colors and restricted use of graduated points due to the small size of the sample. Other spatial information was introduced manually with the use of Google Maps and buffer tools.

The following maps showed the distribution of Latinos in Anchorage as compared to distance to major grocery stores. Grocery stores are the major source of fresh fruit and vegetables regardless of seasonality. The grocery stores included in the maps were Carrs, Fred Meyers, Walmart, and Red Apple in Mountain View. The stores were introduced manually with the visual guidance of Google Maps and the use of buffer tools from GIS helped calculate and project the geographic distance of Latinos to grocery stores.

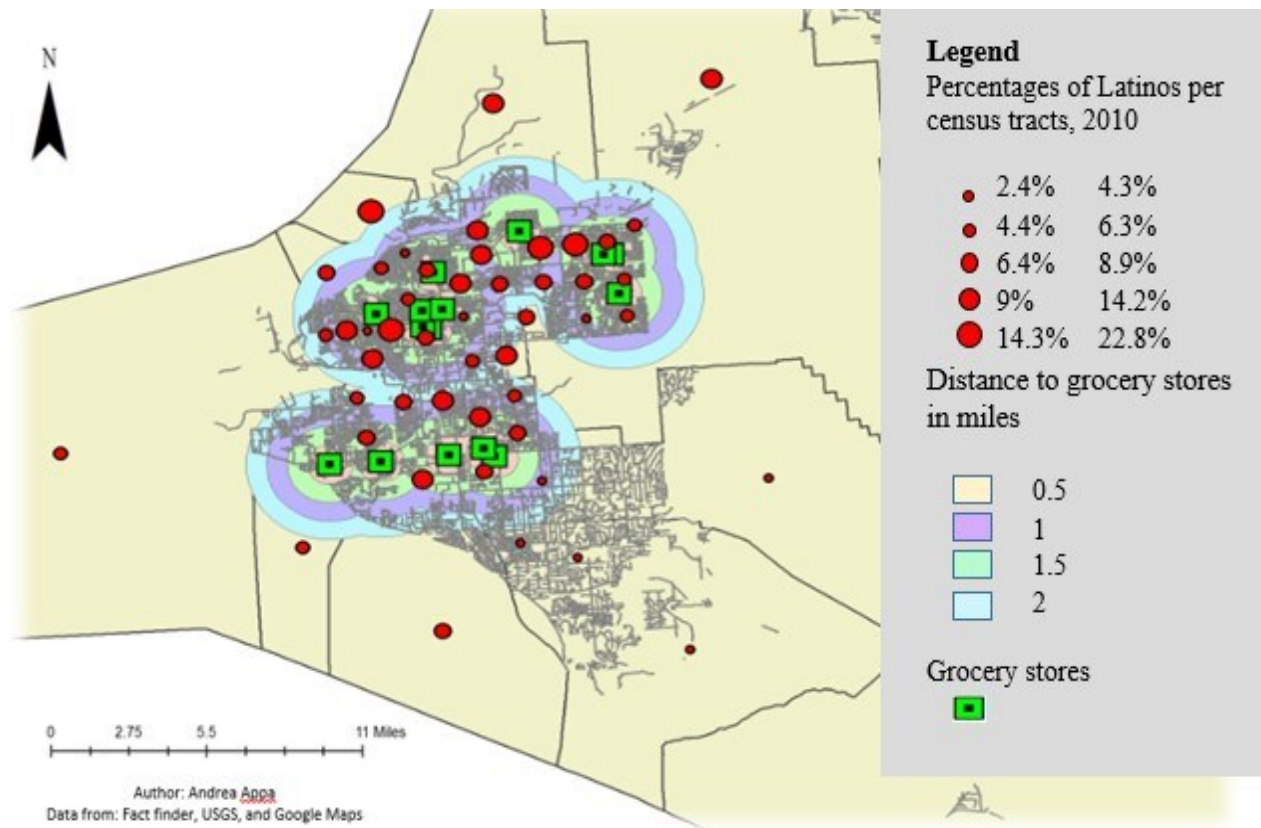
Most of the areas in Anchorage with a 14% to 22% of Latinos were in geographical locations where there was higher distribution of households receiving food stamps (See Figure 7).



*Figure 7.* Distribution of Latino population in Anchorage compared to households receiving food stamps and distribution of major grocery stores.

This map shows a large concentration of Latinos living in areas where 11% to 39% of the households received food stamps. This map also displays the distribution of grocery stores compared to the distribution of Latinos and the distribution of households with food stamps.

The majority of Latinos in Anchorage lived within 1.5 miles of a major grocery store. The distance was greater for those living in northern areas, who reside distance greater than 2 miles away from a grocery store, (See Figure 8).



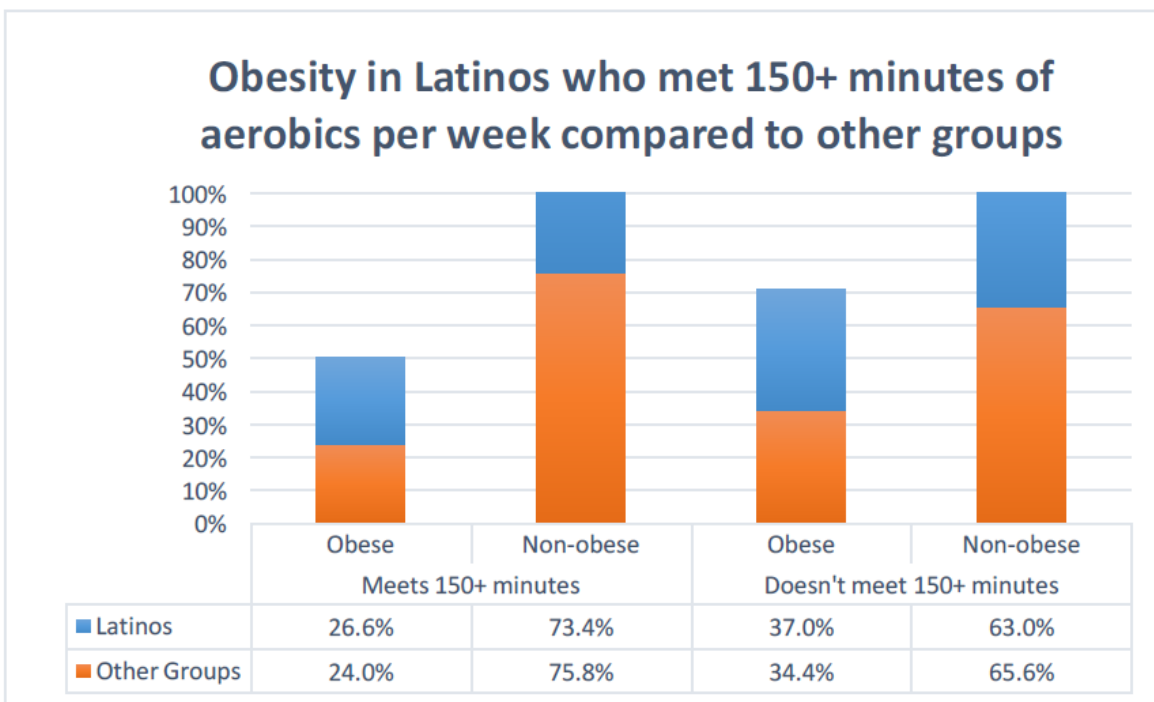
*Figure 8.* Distribution of Latino population in Anchorage and distance to major grocery stores.

Based on the data provided by the maps, there were higher concentrations of Latinos living in areas with higher distribution of food stamps. This could be indicative of the quality and variety of products available for daily consumption. However, the majority of Latinos seemed to live within 1.5 miles of a major grocery store, which indicated that distance might not be a factor affecting access to healthy foods.

### **Exercise and Limitations in Physical Activities**

Variables related to exercise analyzed in this study included “meeting aerobic recommendations - 150 plus minutes of physical activity per week.” When looking at meeting these aerobic recommendations, 26.6% of Latinos who followed the recommendations were obese versus 24% in other groups, and 73.4% of Latinos were not obese versus 75.8%. In

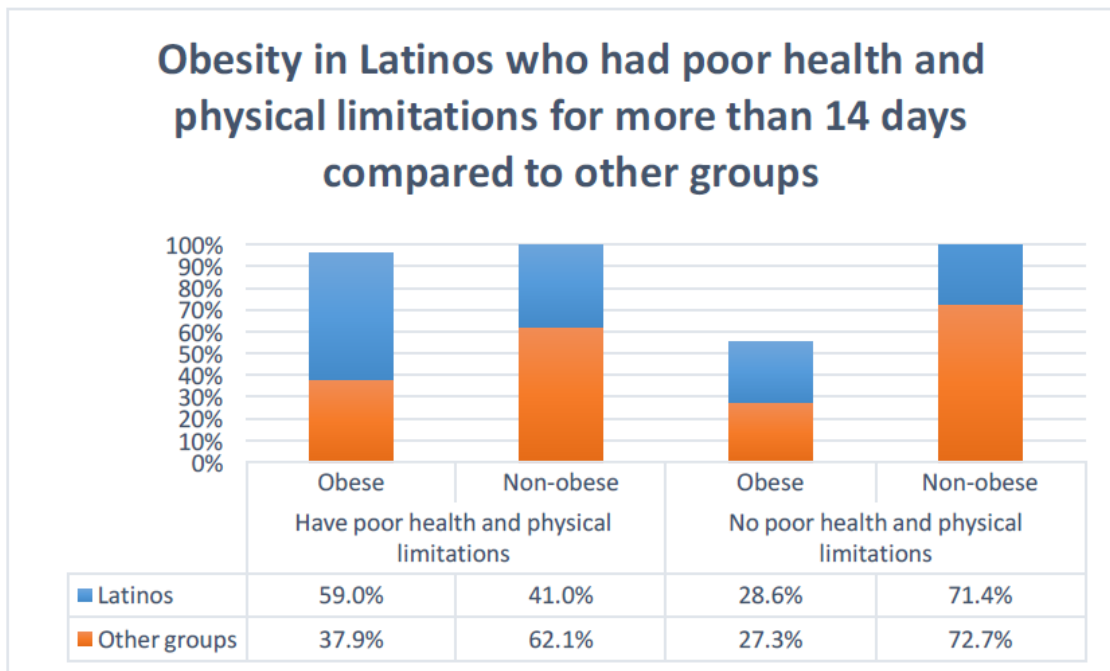
contrast, of those who did not follow the aerobic recommendations, 37% of Latinos were obese compared to 34.4% in other groups and 63% of Latinos were not obese versus 65.6% in other groups (See figure 9).



*Figure 9.* Obesity in Latinos who met 150+ minutes of aerobics per week compared to other groups.

When analyzing activity limitations due to poor health, 59% of Latinos who were obese reported that they had limited activities due to poor health compared to 37.9% for other groups. The results for those who were not obese showed that 41% were Latinos and 62.1% were from other groups. In addition, there were 28.6% of Latinos who were obese and did not have poor health versus 27.3% from other groups, and 71.4% of Latinos who were not obese and did not have poor health compared to 72.7% in other groups (See Figure 10).





*Figure 10.* Obesity in Latinos who had poor health and physical limitations for more than 14 days compared to other groups.

It is important to note that when taking into consideration both “150 + minutes of aerobics a week” and “limitations due to poor health for more than 14 days,” some of the estimates were computed with a sample that falls below 50 respondents. The low number of respondents made it difficult to identify any association between physical activity and obesity.

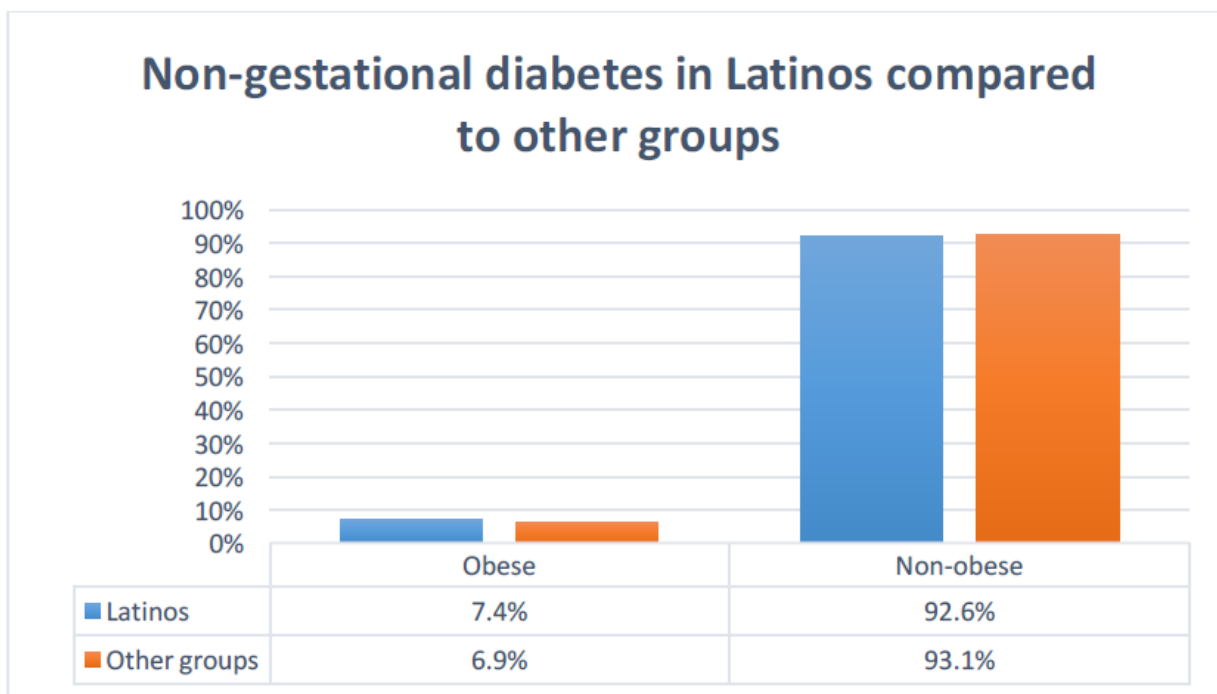
An outstanding feature regarding poor health and activity limitations was that Latinos who suffer from physical limitations had a tendency to become obese more than other groups. This might be due to several aspects of life in this group, including type of diet, occupational options, and the impact of migration. In addition, it appeared that other groups were not as obese when they performed physical activities.

## Health Outcomes

The analysis of health outcomes added insight to the differences in Latinos affected by some health conditions that might be associated with obesity and the possible differences

between Latinos and other groups. For some health outcomes such as high blood pressure, Latinos showed significantly higher percentages than other groups, while for other conditions such as diabetes there was almost no difference in outcomes between groups.

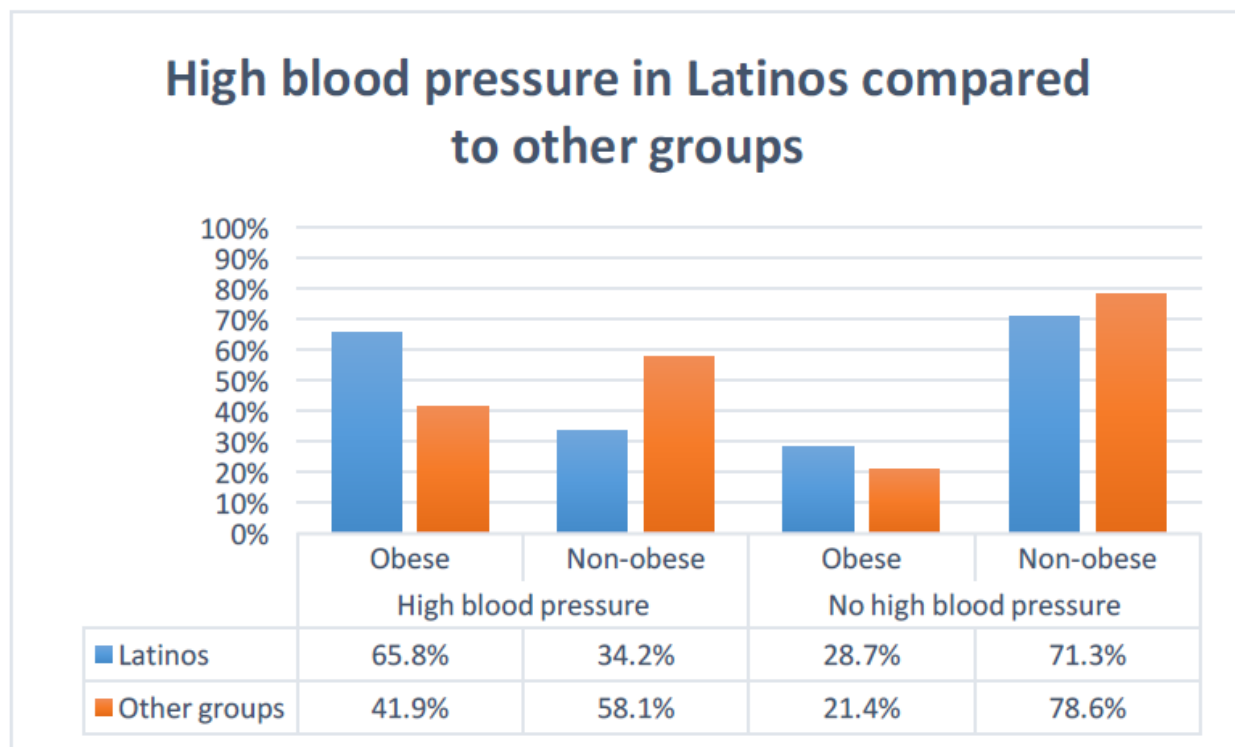
The analysis of differences for those with non-gestational diabetes that were obese showed that 7.4% in Latinos versus 6.9% in other groups, while those Latinos who were not obese represented 92.6% compared to 93.1%. These results showed little difference between groups; percentages for those who were obese were extremely low, compared to those who were not obese (See Figure 11).



*Figure 11.* Non-gestational diabetes in Latinos compared to other groups.

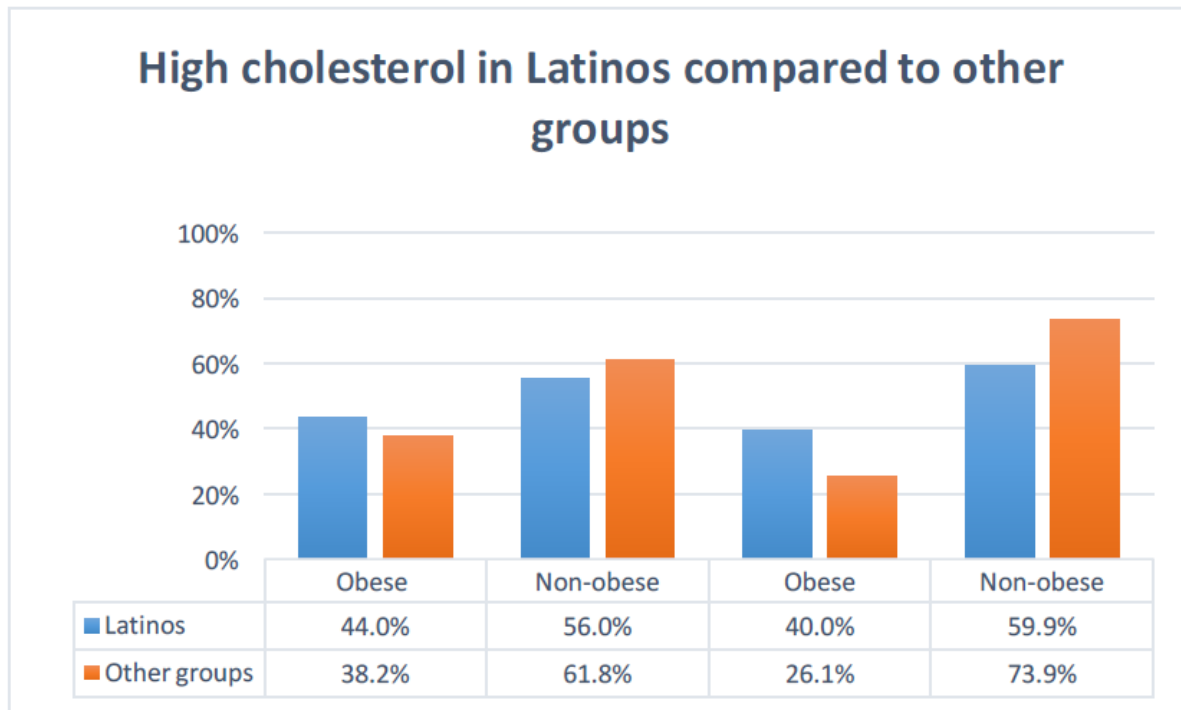
The results for high blood pressure reported by "those who were told their blood pressure was high" and were also obese were 65.8% in Latinos versus 41.9% in other groups, with 34.2% of non-obese Latinos reporting they were told they had high blood pressure and 58.1% in other groups. In contrast, of those that were never told they had high blood pressure, 28.7% were

Latinos who were obese and 21.4% were from other groups, while 71.3% of Latinos were not obese compared to 78.6% in other groups (See Figure 12).



*Figure 12.* High blood pressure in Latinos compared to other groups.

The analysis of high cholesterol in blood shows that 44% of obese Latinos were told they had high cholesterol versus 38.2% in other groups, while 56% of Latinos were not obese. In addition, there were 40% of Latinos who were obese and were never told they had high cholesterol versus 26.1% in other groups. However, 59.9% of Latinos who were never told they had high cholesterol were not obese, versus 73.9% in other groups (See Figure 13).



*Figure 13.* High cholesterol in Latinos compared to other groups.

In general, there was a trend of higher percentages for Latinos when comparing obesity to almost all variables even though most of them were not statistically significant. Percentages of exercise, consumption of fruits and vegetables, mental distress, and poverty were higher in obese Latinos compared to other groups. In spite of low sample numbers, healthy eating in terms of consumption of fruit and vegetables showed that those Latinos who consumed a variety of fruits and vegetables a day are at lower risk of becoming obese. However, GIS exploration of access to fruits and vegetables using data from the Census Bureau showed that a high number of Latinos live within less than 1.5 miles away from a major grocery store, indicating that walking distance might not relate to access to these fresh produce in the Municipality of Anchorage. Data analysis about poverty showed that Latinos had higher percentages but the results were not statistically significant when using variables from the BRFSS. In contrast, data from the Census Bureau using the distribution of food stamps demonstrated that there were higher concentrations of Latinos where there was higher distribution of food stamps.

The major health outcomes that showed higher percentages were high blood pressure and high cholesterol. High blood pressure was the only statistically significant result in the study, which might require further qualitative or survey research to determine if obesity is the only variable determining high blood pressure in Latinos living in Alaska. High blood pressure can be caused by multiple variables that go beyond dietary intake; including occupational stressors such as hours of work a week and types of occupation.

## **Chapter 5: Discussion**

The main findings of this study were: (1) the higher percentages of obese Latinos compared to non-obese in the Municipality of Anchorage and the state of Alaska; (2) the higher percentages of obese Latinos compared to other groups in both Anchorage and Alaska; and (3) the statistically significant percentages of high blood pressure in obese Latinos compared to other groups in the state of Alaska. In addition, the presence of higher percentages for several variables showed the possible presence of disparities in some aspects of the daily lives of this group.

The percentages of poverty measured by comparing “185% of Alaska Poverty Guidelines” to obese and non- obese Latinos yielded a slight difference within the group and compared to other groups. This was indicative that the study of other variables with a larger sample is needed to determine if poverty affects obesity in Latinos. However, as illustrated by the GIS maps, using data from the U.S. Census Bureau from in 2010, there seemed to be a higher concentration of Latinos in areas with high distribution of food stamps. Food stamps using this data appeared to be indicative of poverty in Latinos.

When looking at the objectives of the study, (1) there were higher percentages of obese Latinos reporting mental health distress than other groups and (2) there were higher percentages of obese Latinos that met the 185% guidelines poverty guidelines for the state of Alaska. However, these results were not statistically significant or exhaustive of the issue of mental health and poverty as they might affect levels of obesity in this group.

In spite of the limitations in numbers of respondents for some of the variables, most of the variables that met the criterion of more than 50 respondents showed higher percentages in Latinos, which might mean that Latinos were at higher risk than other groups for developing

some of the health outcomes associated with obesity. However, most of the tests in this study were not statistically significant, except for the high percentages of high blood pressure in Latinos. Numerous living conditions can promote high blood pressure other than dietary intake. Some of these conditions include occupational stressors and family dynamics. Further research is needed to assess the nature of this association in Latinos living in the state of Alaska.

## **Chapter 6: Strengths and Limitations**

The major strength of this project was that it represented the first data exploration about determinants of obesity in Latinos in the state of Alaska. The results from this study could be used to compare with other states and nationwide to determine differences within the group and compared with other groups. Furthermore, the results could also be used in future qualitative or quantitative studies that explore obesity in Latinos living in circumpolar areas.

One of the limitations of this study was the size of the sample. This made it difficult to choose variables that would be representative of the group. Further research is needed to explore some of these determinants of obesity in depth. Even though higher percentages might indicate that Latinos could be experiencing health disparities, this study did not show statistically significant differences between Latinos and other groups regarding determinants of obesity. In addition, this study was limited to the results of the BRFSS, which did not exhaust all the possible determinants of obesity in humans. Some of the additional questions that could be added to the database to capture differences in dietary intake should include background differences such as nationality and types of traditional foods that are highly consumed by specific groups.



## **Chapter 7: Public Health Implications**

As described in the literature review, several aspects of daily life can affect obesity in ethnic groups. Those that were explored in this study showed that Latinos had higher percentages in several aspects that could determine obesity and its health outcomes. However, the most outstanding public health implication was shown by the results of the study of percentages of high blood pressure in Latinos as compared to other groups. The results illustrate that Latinos were at a higher risk of developing high blood pressure than other groups. Moreover, this might mean that Latinos might be at a higher risk of developing medical conditions that can be caused by high blood pressure. Further studies looking for the causes of high blood pressure in Latinos should be a public health priority when it comes to the health and wellbeing of this group in the state of Alaska.

Some of the public health initiatives that could be implemented to improve issues with high blood pressure would include health literacy workshops and creating health education materials to be distributed in clinics and schools. Distributing health information to key members of the Latino community, and instructing them to disseminate this information is key to creating awareness of health issues and possible solutions.

First, it would be important to assess which community agencies serve high numbers of Latinos with health and social services. Second, there should be materials in Spanish language readily available in identified places. These materials need to reflect the dietary and exercising habits of Latinos, instead of being just plain translations of health recommendations. Cultural practices associated with diet, exercising, and body image varies depending on the group and what might work for the mainstream culture might not work for other groups.

## **Chapter 8: Conclusions and/or Recommendations**

In sum, the results of the study showed that Latinos had higher percentages for several determinants of obesity. These determinants included dietary intake, such as reduced consumption of fruits and vegetables, poor health and physical limitations, and mental distress. However, these higher percentages were not statistically significant. More research is needed to determine if these estimates would still be higher with a large sample size.

Health outcomes did not seem to be too different from other groups, except for high blood pressure. The results for non-gestational diabetes were surprisingly low for both Latinos and other groups who were obese. In addition, reports of high cholesterol in blood seemed to be higher in Latinos who were obese. However, the high estimates of high blood pressure in Latinos who were obese were significantly higher, which showed a call for specific studies on the cause of high blood pressure in this group. High blood pressure might be caused by several variables that go beyond dietary intake and obesity. Qualitative studies might yield insights as to what aspects of the lives of this group made blood pressure stand out from the rest of the health outcomes.

Health initiatives should include educating and monitoring individuals with high blood pressure in the Latino population. In addition, health clinics should survey those who do have high blood pressure and state they do not treat their condition. It is important to capture the specific causes of lack of treatment to promote possible health behavioral changes.

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## Appendix

### Letter of Support from the Community Partner



THE STATE  
of **ALASKA**  
GOVERNOR BILL WALKER

#### Department of Health and Social Services

DIVISION OF PUBLIC HEALTH  
Section of Chronic Disease Prevention and Health  
Promotion

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Ms. Andrea Appa  
[ANAPPA@Alaska.Edu](mailto:ANAPPA@Alaska.Edu)

August 10, 2015

Re: Determinants of Obesity in Latinos Prospectus and Access to Behavioral Risk Factor Surveillance System Data

Ms. Appa,

This letter confirms my approval of your MPH project prospectus on Determinants of Obesity in Latinos in Anchorage, Alaska and granting access to the Behavioral Risk Factor Surveillance System (BRFSS) under my direct supervision. At mutually convenient times, you are welcome to meet with me to run your SPSS programs against the comprehensive BRFSS datasets.

Access will be allowed to BRFSS datasets that do not include any personally identifiable information. All analyses will be verified to meet BRFSS data suppression rules of being based upon 50 or more respondents in order to preserve the anonymity of respondents and only aggregated results will be released. This mentored approach to analysis allows for more data exploration than would be possible using a dataset scrubbed of potential identifiers such as age, sex, income, and other variables that could in combination with other data sources increase the potential for breaching confidentiality and undermine the public health surveillance system. These demographic and socioeconomic variables may be needed to control for factors influencing obesity when conducting advanced statistical analysis. I will adapt your programming syntax to work with my datasets, run the programs, and together we can discuss the output and follow-up on any productive leads that you discover. You will only be allowed to take away electronic versions of statistical analyses that meet the data quality and suppression rules of the BRFSS.

All analyses will be conducted at my office in suite 722 of the Frontier Building at 3601 C St. in Anchorage. Both statistical packages of SPSS and SAS are available. You may arrange meeting times by contacting me at either [Charles.Utermohle@Alaska.gov](mailto:Charles.Utermohle@Alaska.gov) or (907) 269-8030.

I am looking forward to facilitating your research on this important component of Alaskans.

Thank you.

Respectfully,

Charles J. Utermohle, PhD  
Public Health Data Analyst  
[Charles.Utermohle@Alaska.gov](mailto:Charles.Utermohle@Alaska.gov)  
(907) 296-8030

